

TAA

**TECHNICAL
COMMITTEE FOR
PLANT SAFETY**

at the

Federal Ministry for the

Environment, Nature Conservation and

Nuclear Safety

Evaluation of the Experience Reports

on Safety Checks by Experts

according to Article 29a of the Federal

Immission Control Act (BImSchG) in

2002

Summary

TAA-GS-34.1-K

The German version is determining.

The Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, following the recommendation made by the Technical Committee for Plant Safety (Technischer Ausschuss für Anlagensicherheit, TAA), set up a Subcommittee on Experience Reports (Unterausschuss Erfahrungsberichte, UA-EB) and commissioned it with the evaluation of the annual experience reports of the experts as provided for by Article 29a of the Federal Immission Control Act (BImSchG).

It is the purpose of the evaluation compiled in the TAA-GS-34.1 report to make use of the experience reports for the improvement of plant safety and to indicate to operators, authorities and experts where there is potential for improving plant safety. Another task of the Subcommittee on Experience Reports is the assessment of activities as of seminars or conferences on the experience exchange, which are organized by non governmental institutions, and to record the degree of participation by experts in these.

The administrative evaluation carried out by the SFK¹/TAA head office basically records whether reports are handed in in time and checks the compliance with the requirements set out in the TAA-GS-20 guidelines in terms of the format and completeness of data.

The evaluation in terms of the technical content of the experience reports was carried out by the members of the Subcommittee on Experience Reports. It includes the

- Identification of general conclusions regarding deficiencies in plant safety
- Identification of necessary amendments of the relevant technical rules and regulations

and provides the basis for the committee to draw up basic recommendations and conclusions.

By the end of 2003 the TAA head office had received annual experience reports based on Article 29a BImSchG for the year 2002 from 188 (69 %) of the officially accredited experts, 98 of which handed in reports on completed safety checks which as far as their presentation was concerned, largely corresponded to the TAA-GS-20 guidelines.

A total of 433 safety checks has been carried out by the accredited experts and in approximately half of the cases no major shortcomings were detected.

It was noted that the majority of reports was suited for the evaluation by the Subcommittee on Experience Reports. The most common formal error made related to missing data on the expert carrying out the check, missing or incorrect data on the check itself or missing or insufficient description of faults or missing failure coding.

¹ SFK: Störfall-Kommission, Hazardous Incidents Commission

The opinion of the Subcommittee on Experience Reports is that experts should, if possible, refrain from using abbreviations (e.g. for the description of plant components) which might be unclear for third persons.

About 20 % of the reports listed “conclusions for the improvement of plant safety”. However, by and large these referred specifically to the plants checked and rarely led to generally recommendations on how to improve technical rules and regulations. All other cases specifying requirements related to a non-consistent or non-compliant application of the rules and regulations.

The experience reports are an important source for rating the present status of plant safety in Germany. The systematic evaluation of the experience reports helps to detect difficulties in the application of the relevant technical regulations, to identify possible needs for additional regulations and to give recommendations for the further development of plant safety.

Recommendations and Conclusions of the Subcommittee on Experience Reports

The evaluation of the 2002 experience reports identifies the following recommendations and conclusions which are to be forwarded to the competent authorities of the Federal Republic and to the German Federation of institutions for statutory accident insurance and prevention (Hauptverband der gewerblichen Berufsgenossenschaften, HVBG):

1. Recommendations

- In non automated operations of production processes involving substances with a high hazard potential the “four-eyes-principle” should be used on a mandatory basis to ensure a safe running of the operation.
- The magnitude of a secondary fire can be increased if a dike is built on the premises according to the provisions of the Water Pollution Control Legislation (counterproductive). If large fire loads are to be expected, the concept of a second barrier should also permit a burn-out pit outside the plant building.

2. Conclusions

- Operators of small and medium-sized enterprises had difficulties with the implementation of the technical regulations in particular with those relating to fire and explosion prevention (in this context protection against dust explosion poses a special problem).
- In the case of biogas plants problems occurred with the implementation of the technical regulations and in particular with those relating to fire and explosion prevention and electrical installations.
- Explosion prevention concepts have to take regard of organizational measures of safe inerting in cleaning and emptying processes and a documentation thereof.
- The requirement for a safe release from pressure relief installations had often not been put into practice in a consistent manner.
- Requirements relating to constructional fire prevention measures (e.g. pipe and cable conduits in fire protection walls) were not sufficiently observed.
- The classification of or the requirements relating to safety instrumented systems were insufficiently observed in particular in small and medium-sized enterprises (ref. to VDI/VDE 2180).
- Periodic inspections of safety instrumented systems were not carried out.
- There were no periodic inspections according to the Safety of Equipment Act (GSG).
- Requirements relating to the development, testing and administration of user software for the safe management of programmable control units did not comply with VDI/VDE 2180 sheet 5.
- Shortcomings were detected in NH₃-refrigerating plants with respect to the implementation of the technical regulations (planning, technical layout, updating of documentation) and with respect to insufficient or missing specification tests or documentation.²
- Detection of or safeguards against hazards arising from substance reactions which can develop from an accidental backflow of individual reactants through wrong pipe connections were not carried out to a sufficient degree.

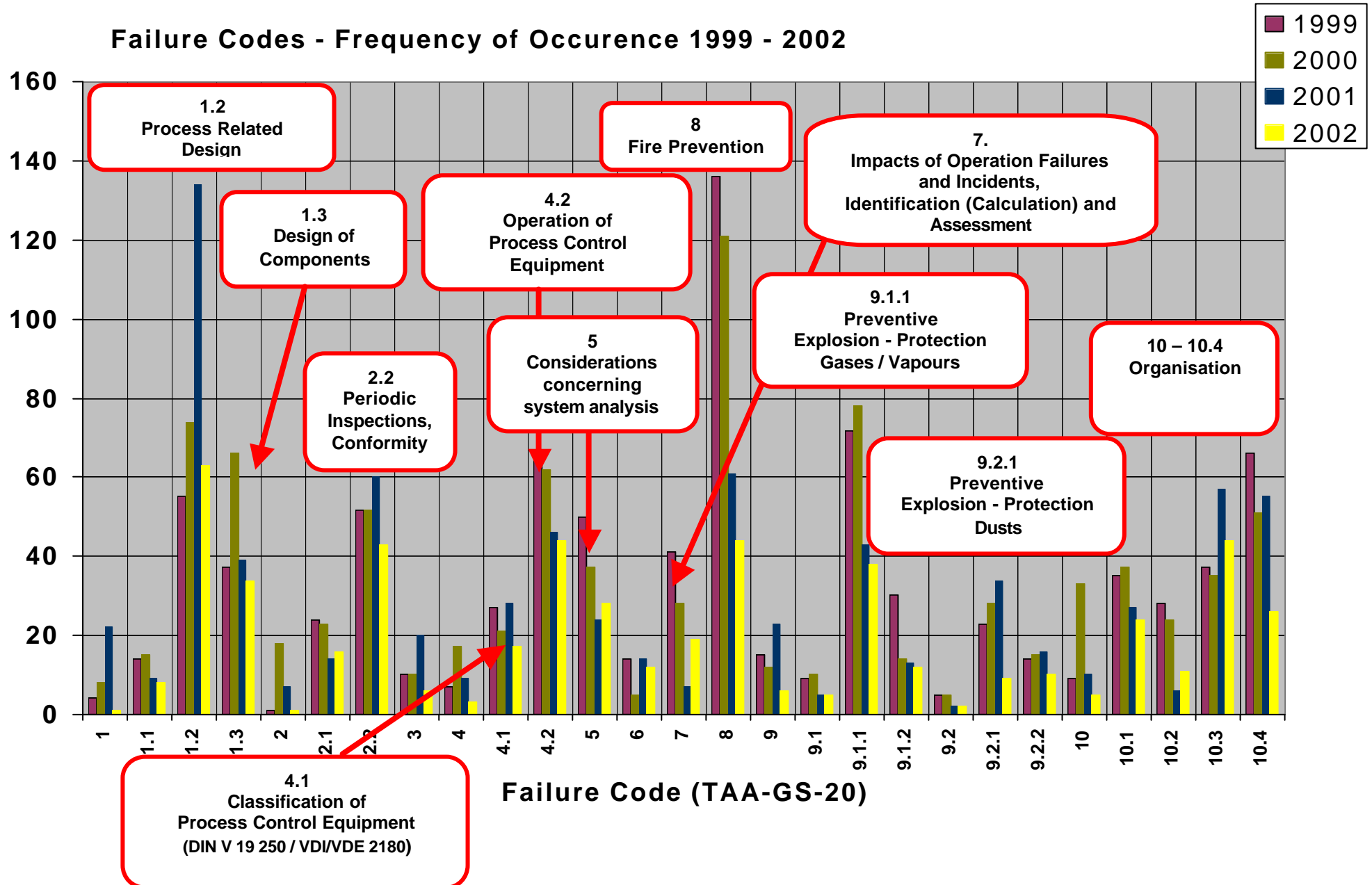
²

Major faults were found in about half of the presented checks of ammonia refrigerating plants.

- Safety management or the way it was presented did not correspond to the Hazardous Incident Ordinance.
- Process and operational manuals were incomplete, missing or were not communicated.
- Instruction of the operational staff and briefing of staff from other companies was incomplete.
- Contingency plans / alarm and hazard prevention plans did not correspond to the Hazardous Incident Ordinance or were not updated.
- No documentation of repairs and alterations was carried out.
- Systematic hazard analysis and safety concepts should extend to all areas of an operating range.
- During the planning, construction and operating phase it is helpful to have a systematic hazard analysis also for those installations not covered by the Hazardous Incident Ordinance.

By way of summary it can be noted that the bulk of shortcomings often occur in the same areas they did for the 1999 to 2001 period, displaying marked deficiencies in the following areas: (constructional) fire prevention, explosion prevention, process control engineering, process related design and organisation (see graph below).

Failure Codes - Frequency of Occurrence 1999 - 2002



Code	Topic
1.	design of plants and plant parts taking into account potential strain during a disruption of normal operation
1.1	design and dimensioning of construction components (earthquake resistant construction, wind loads, other loads)
1.2	process related design (process management, plant protection concepts)
1.3	design of components (design and dimensioning, materials, strain imposed by pressure, temperature, media)
2.	quality assurance and servicing of plants, checks
2.1	maintenance and repair works
2.2	periodic inspections (start-up check and regular checks), conformity
3.	supply with energy and operating resources (electricity, fuel, vapour, water, control air, others)
4.	process control equipment, electrical engineering
4.1	classification according to DIN V 19 250 or VDI/VDE 2180
4.2	Operation of Process Control Equipment construction/make of the safety instrumented systems
5.	considerations concerning systems analysis (hazard analysis, safety analysis)
6.	chemical, physical, human-eco toxicological properties of substances and preparations (determination and/or assessment of toxicological, chemical, physical and reaction engineering properties of substances and preparations)
7.	impact of operation failures and incidents, identification (calculation) and assessment (hazard scenarios)
8.	fire protection, retention of fire-fighting water (constructional fire protection, early detection of fire, fire-fighting measures, fire loads, retention of fire-fighting water)
9.	in-plant explosion protection and protection against impacts from outside explosions
9.1	gases/vapours
9.1.1	preventive explosion protection
9.1.2	constructional explosion protection
9.2	dusts
9.2.1	preventive explosion protection
9.2.2	constructional explosion protection
10.	organisation
10.1	alarm and hazard prevention plans
10.2	escape and rescue routes
10.3	measures relating to the set-up of the plant
10.4	safety management